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The Exchange Rate and Canadian Inflation Targeting

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Abstract

The author provides a non-technical explanation of the role played by the exchange rate in Canada's inflation-targeting monetary policy. He reviews the motivation for inflation targeting and describes the monetary transmission mechanism. Though the exchange rate is an integral component of the transmission mechanism, the author explains why it is not a target for monetary policy. He provides a simple taxonomy for exchange rate movements, distinguishing between movements associated with direct shocks to aggregate demand and those unrelated to such direct shocks. He explains the importance to monetary policy of determining the cause of any given movement in the exchange rate, and of determining the net effect on aggregate demand. The author also describes Canadian monetary policy during the 2003–04 period, a time when the Canadian dollar appreciated sharply against the U.S. dollar.

JEL classification: E50, E52, F41
Bank classification: Exchange rates; Inflation targets; Monetary policy implementation

Résumé

L'auteur explique en termes non techniques le rôle du taux de change dans la politique monétaire canadienne, qui est axée sur la poursuite d'une cible d'inflation. Il indique les raisons de l'adoption d'un tel objectif et décrit le mécanisme de transmission monétaire. Il expose pourquoi le taux de change ne constitue pas une cible pour la banque centrale même s'il fait partie intégrante du mécanisme de transmission. L'auteur classe les variations du taux de change en deux catégories : celles associées à des chocs ayant un effet direct sur la demande globale et celles qui ne le sont pas. Il souligne combien il importe, du point de vue de la politique monétaire, de déterminer la cause de toute fluctuation du taux de change ainsi que l'effet net de celle-ci sur la demande globale. Il analyse aussi la politique monétaire menée au Canada en 2003 et 2004, au moment où le dollar canadien enregistrait une forte appréciation par rapport au dollar É.-U.

Classification JEL : E50, E52, F41
Classification de la Banque : Taux de change; Cibles en matière d'inflation; Mise en œuvre de la politique monétaire

1. Introduction

Fluctuations in Canada's exchange rate are often a popular topic in discussions of the Canadian economy and of the Bank of Canada's monetary policy. Following the Asian crisis in the late 1990s, for example, the Canadian dollar depreciated from 74 cents (US) in the summer of 1997 to approximately 65 cents (US) a year later. As the world economy recovered from a period of slower growth a few years later, the Canadian dollar appreciated by roughly 30 per cent, from 63 cents (US) in early 2002 to almost 85 cents (US) in late 2004.

Such movements in the exchange rate have important implications for the Canadian economy, but there are differences in opinion regarding how the Bank should respond to such changes. Some observers, apparently in favour of a strong currency, argue that the Bank should prevent substantial depreciations of the Canadian dollar. Others, who are apparently proponents of a weaker currency, argue that the Bank should act to prevent significant appreciations of the Canadian dollar. Both arguments appear to be based on the view that there is a "right" value for the Canadian exchange rate and that the Bank should prevent the actual exchange rate from straying too far from this value.

This paper provides a non-technical explanation of how the exchange rate fits into the Bank's framework for monetary policy.[1] Four key points are made. First, a flexible exchange rate is an essential part of the Bank's overall policy of attempting to keep inflation low and relatively stable. Second, the Bank does not target any specific value for the exchange rate; the exchange rate is determined by the market. Third, movements in the exchange rate are very important for the conduct of monetary policy, for two reasons: (i) they often reflect events in the Canadian and/or global economies that have a direct influence on Canadian aggregate demand, and (ii) they cause adjustments in relative prices that, in turn, influence Canadian aggregate demand. Fourth, following any given movement in the exchange rate, the appropriate response for monetary policy depends crucially on the cause of the movement. Only by determining the reason for the exchange rate movement is it possible to determine the net impact on Canadian aggregate demand and thus the appropriate response, if any, for monetary policy.

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[1] In providing such an explanation, this paper expands on and provides further background to Dodge (2005); it draws on arguments that appear in Ragan (1999).

This paper is organized as follows. Section 2 reviews the motivation for inflation targeting and provides a simplified view of the transmission mechanism of monetary policy—the complex chain of cause-and-effect through which the Bank's policy actions have an effect on asset prices, aggregate demand, the gap between actual and potential output, and inflation. Here movements in the exchange rate are shown to be both the *result* of some changes in the economy and the *cause* of other changes. As will become clear, the exchange rate is an integral part of the monetary transmission mechanism in a small open economy.

Sections 3 and 4 offer a simple taxonomy of two types of exchange rate movements. For analytical purposes, I distinguish between movements in the exchange rate that ultimately reflect and are caused by changes in the demand for Canadian goods and services, and movements in the exchange rate that are caused by events with no direct effect on Canadian aggregate demand. One example of the first type is growth in world income that causes an increase in the relative demand for Canadian exports and an appreciation of the Canadian dollar. An example of the second type is an adjustment of international asset portfolios that causes an increase in the relative demand for Canadian assets and an appreciation of the Canadian dollar. With several illustrative examples, I explain the nature of the exchange rate movement, the net effect on Canadian aggregate demand, and the implications for monetary policy.

Section 5 explains why the conduct of monetary policy is complicated by the fact that both types of exchange rate movements are often happening simultaneously. In this situation, the challenge for monetary policy is to assess the relative importance of each type of exchange rate movement, and thus to determine the net effect on Canadian aggregate demand. Monetary policy is also complicated by uncertainty about the likely duration of any movement in the exchange rate, as well as by the uncertainty regarding the magnitude and the time lags of the linkage between movements in the exchange rate and subsequent changes in net exports. The section concludes by offering a brief description of Canadian monetary policy during the 2003–04 period, when the Canadian dollar appreciated sharply against the U.S. dollar. I show that the analytical distinction between the two types of exchange rate changes offers a lens through which one can interpret the Bank of Canada's actions. Section 6 offers some conclusions.

2. A Review of Canada's Monetary Policy Framework

Before describing the monetary transmission mechanism, I briefly review the motivation for inflation targeting.

2.1 Why target inflation?

The Bank's ultimate objective is to make the best possible contribution to the economic well-being of Canadians. Based on a large body of theoretical and empirical research, the Bank's policy (and that of most other central banks) is grounded in two main propositions:

(i) high inflation is damaging to the economy and costly for individuals and firms, and

(ii) monetary policy is unable to have systematic and *sustained* effects on any economic variables other than the rate of inflation.

In periods of high average inflation, the annual rate of inflation is typically unstable and thus difficult to predict (Friedman 1977). High inflation also tends to increase the volatility and uncertainty of relative prices for goods and services (Longworth 2002). High inflation therefore tends to inject considerable uncertainty into the economy and to undermine the ability of the price system to convey accurate signals of scarcity through movements in relative prices. As a result, high inflation leads firms and individuals to make mistakes in their day-to-day consumption, work, and investment decisions that would be absent in a low-inflation environment. This is the essence of the case for maintaining low and stable inflation.

There is considerable evidence that monetary policy can have profound effects on real economic variables such as output and employment over short periods of time—indeed, central banks' actions would not be as closely followed by the press and financial markets if this were not true. But the weight of both theory and empirical evidence in Canada and abroad suggests that monetary policy has no systematic and *sustained* effect on economic variables other than the rate of inflation, for reasons that are well known and are perhaps most clearly articulated by Friedman (1968).

If high inflation is costly, and monetary policy can only have lasting effects on the rate of inflation, it is not surprising that most central banks have come to adopt inflation control as their primary objective. By providing an environment in which inflation is kept low and relatively stable—in which private firms and individuals can most easily plan and prosper—the Bank makes its best possible contribution to the overall well-being of Canadians.

Within the Bank's current inflation-targeting framework, the formal *policy target* is the rate of inflation, and the Bank's objective is to keep the annual rate of inflation of the consumer price index (CPI) close to 2 per cent and relatively stable within the 1–3 per cent target band. Given the volatility of the prices of specific products, the Bank pays especially close attention to the behaviour of "core" inflation, which is derived by stripping out the eight most volatile elements from the broader measure of CPI inflation and adjusting the remaining components for the effects of changes in indirect taxes (Macklem 2001). Though core inflation and overall CPI inflation often deviate from each other over short periods of time, they move closely together over longer periods, revealing that the underlying inflationary trends captured by each are broadly similar.

2.2 The monetary transmission mechanism

The Bank's commitment to maintaining low and stable inflation is essential for influencing firms' and households' *expectations* of future inflation. Faced with a shock that pushes inflation either above or below the inflation target, Canadian firms and households are confident that the Bank will act to bring inflation back to the 2 per cent target within a 2-year period. As a result, they are less likely to allow the current shock to alter their expectations of future inflation—their expectations tend to be well *anchored*. The anchoring of inflation expectations is an essential part of successful monetary policy.

The importance of well-anchored inflation expectations is best illustrated by considering what happens when such anchoring is not present. During the 1970s and 1980s, for example, the inflation-control process was difficult because economic shocks led to adjustments in expectations, which, in turn, led to behaviour that influenced actual inflation. An important lesson learned since the early 1990s, in Canada and elsewhere, is that keeping inflation

expectations anchored at the 2 per cent target is an important part of keeping actual inflation low and relatively stable.

The monetary transmission mechanism is a complex chain of cause-and-effect that runs from the Bank's actions to changes in asset prices, aggregate demand, the output gap, and eventually inflation. Within the economics profession, there is some debate about the nature of the transmission mechanism. Engert and Selody (1998), for example, emphasize the importance between the "passive money" and "active money" views of the transmission mechanism, and argue that the chance of making policy errors can be reduced by paying attention to both views.[2] Even those who agree on the broad nature of the mechanism recognize the considerable uncertainty regarding the timing and quantitative importance of specific linkages. A collection of speeches and research papers published by the Bank of Canada (1996) provides a mainstream view of the transmission mechanism.[3] Figure 1 provides a stylized characterization of this view; the anchoring of inflation expectations is shown with a dashed line, and a thicker line conveys its important role.

Consider a situation in which the Bank expects inflation to rise above 2 per cent and approach the top of the target range over the next year or so, perhaps due to a strong pickup in the world economy that leads to an increase in demand for Canadian exports. In this case, the Bank's appropriate policy response would be a tightening of monetary policy, to slow the growth of aggregate demand and prevent the emergence of excess demand that would otherwise cause inflation to rise. How do the Bank's actions achieve this objective?

The Bank begins in this case by raising its *policy instrument*—the target for the overnight rate. Two responses are expected, assuming no other economic shocks occur. First, the substitutability between short-maturity and longer-maturity assets results in the hike in the overnight rate "trickling" its way up the term structure, raising longer-term interest rates. Second, as interest rates rise in Canada, mobile financial capital is attracted to the higher yields on

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[2] Laidler and Robson (2004, especially Chapter 3) offer a balanced and very readable description of both views of the monetary transmission mechanism.

[3] See, in particular, Thiessen (1995) for a description of the transmission mechanism, and Duguay (1994) for empirical estimates.

Canadian assets. This capital inflow increases the demand for the Canadian dollar and causes it to appreciate on foreign exchange markets.

The policy-driven increase in interest rates will slow the growth in demand for investment goods, residential housing, and some consumer durables.[4] The associated appreciation of the Canadian dollar will reduce the growth of income earned by Canadian exporters; it will also decrease the Canadian-dollar price of imported goods and lead Canadian firms and households to increase their demand for imports. The reduction in the growth of investment and consumption spending, combined with the reduction in the growth of net exports, implies a reduction in the growth of Canadian aggregate demand.[5]

The economy's total level of output (GDP) is largely determined by demand in the short run, but almost exclusively by supply in the long run. In other words, changes in the level of aggregate demand will lead Canadian producers to change the level of output in the same direction. Over periods of several years, however, the economy's productive capacity—determined by labour-force growth, capital accumulation, and productivity growth—becomes a binding constraint, and output will therefore be determined by the economy's level of *potential output*.[6]

The reduction in the growth of aggregate demand caused by the Bank's raising of its policy interest rate therefore causes a slowing of GDP. With some underlying trend growth rate of potential output, this reduction in the GDP growth rate implies an increase in the *output gap*—the difference between potential output and actual GDP.

The final link in the transmission mechanism is that between the output gap and the rate of inflation. If the slowing of aggregate demand causes the *level* of GDP to fall below potential

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[4] The responsiveness of spending to changes in interest rates varies across sectors of the economy. See Farès and Srour (2001) for Canadian evidence and Dedola and Lippi (2005) for U.S. and European evidence.

[5] This discussion focuses on the effect of the Bank's monetary policy on consumption, investment, and net exports. The only remaining component of aggregate demand, government purchases of goods and services, is determined by the spending plans of Canada's federal, provincial, territorial, and municipal governments.

[6] I could complicate Figure 1 and the associated discussion slightly by allowing for some short-run role for changes in aggregate supply, coming from changes in firms' costs. This would not change the central message that changes in aggregate demand will lead to changes in output in the short run, but that in the long run aggregate output will be determined by the level of potential output.

output, the economy's firms are producing below their capacity. This state of excess supply is eventually felt in the markets for labour and other inputs, and it leads to reductions in wages and other factor prices (or reductions in their rate of growth). These lower costs for inputs then contribute to a reduction in the rate of inflation relative to what would have occurred had the Bank not tightened its monetary policy.

Thus, the Bank's decision to raise the target for the overnight rate leads to a reduction in the growth rate of aggregate demand and a reduction in the rate of inflation. Faced with the expectation of a shock that would otherwise have increased output above potential and thus increased the rate of inflation, the Bank's policy action works to stabilize both the growth rate of output and the rate of inflation. Blanchard (2003) refers to this joint stabilization of output and inflation as the "divine coincidence" of inflation targeting.

The increase in longer-term interest rates and the appreciation of the Canadian dollar also have more immediate effects on inflation that are unrelated to their influence on aggregate demand. As interest rates rise, the cost of home mortgages increases, pushing up some components of the CPI. As the Canadian dollar appreciates, the price of imported consumer goods falls, reducing other components of the CPI—this effect is known as *exchange rate pass-through*. Both effects are observed relatively quickly but are also quite modest. They are shown with dashed lines in Figure 1.

I have emphasized the Bank's policy action in anticipation of a shock that would increase output and inflation. The same logic works in the opposite situation, when the Bank expects a shock to reduce the growth rate of output and push inflation below its target. In this case, the Bank would reduce its policy interest rate, thus stimulating aggregate demand and offsetting the negative inflationary pressures.

There are considerable time lags between the Bank's policy actions, changes in quantities such as investment and net exports, the full effect on aggregate output, and the eventual effect on the rate of inflation. The Bank estimates that it takes between 12 and 18 months before most of the effect from a policy action on aggregate output is observed, and between 18 and 24 months before most of the effect on inflation occurs. These estimates are subject to considerable variation.

The central implication of these long and variable time lags is that monetary policy must be *forward looking*—that is, the Bank ideally must look forward and anticipate shocks that are likely to occur, and implement policy accordingly. By waiting until the effects of shocks become visible, and then responding with policy actions, the effects of the policy would come far later than the effects of the shocks the policies are designed to offset. A real possibility is that such *reactive* monetary policy would be destabilizing for output and inflation. Such concerns regarding the time lags in monetary policy, combined with the incomplete information regarding the various linkages in the transmission mechanism, have led some economists to suggest that a crucial objective for central banks is to avoid being a source of uncertainty and instability in the economy (Friedman 1968). This is an argument against fine-tuning and for attempting to offset the effects of only significant and persistent shocks.

2.3 The role of the exchange rate

The preceding description of the monetary transmission mechanism illustrates why monetary policy is best viewed as a *process* rather than an *event*. Any specific policy action may indeed be considered an "event." But given the overall context in which any policy decision is taken, including the current state of the economy, the likely future shocks, and the uncertainties within the transmission mechanism, each policy action is more meaningfully viewed as a small part of a large and complex process.

What is the role of the exchange rate in this complex process? From Figure 1 it is clear that policy actions by the Bank will have their intended effect on aggregate demand and inflation only if they also have their intended effect on asset prices—interest rates and the exchange rate. In other words, monetary policy, in part, *works through* its effect on the exchange rate. In this sense, movements in the exchange rate are seen as being both causes and effects. A movement in the exchange rate can be the *effect* of a policy action by the central bank; by changing the relative prices of domestic and foreign products, the movement can also *cause* a change in aggregate demand. Thus the exchange rate is an integral part of the monetary transmission mechanism. This is as true for Canada as it is for any country actively involved in the international trade of goods, services, and assets.

The exchange rate does not change only because of monetary policy actions, however. Shocks to foreigners' demand for Canadian goods or services, or shifts in global asset portfolios away from or towards Canadian assets, can also cause movements in the exchange rate. In such cases, movements still occur in the exchange rate as both causes and effects. A movement in the exchange rate can be the *effect* of a shock in foreigners' demand for Canadian products or assets; and by altering relative prices, the movement can *cause* a change in Canadian aggregate demand.

In general, it is helpful to remember that an exchange rate is simply the price of one country's currency in terms of another country's currency, and this relative price is determined in the world's foreign exchange markets, which in turn are influenced by the global markets for goods, services, and assets. Movements in an exchange rate are therefore market adjustments to fundamental changes in some element of the world economy, which may be driven by monetary policy or by a large number of other factors.

The fact that movements in the exchange rate are both a cause and an effect is an important theme in this paper, and one to which I will return in the next two sections. In describing how the Bank can best respond to any recent or expected movement in the Canadian exchange rate, I show that the Bank must first determine, with as much precision as possible, what the cause of the movement is, and also what the likely effect on aggregate demand will be. Only then can the Bank respond appropriately.

2.4 The exchange rate is not a policy target

Despite the exchange rate's importance to monetary policy, it is not a policy target for the Bank. The exchange rate is important to monetary policy for two reasons. First, monetary policy works partly through its effect on the exchange rate. Second, most movements in the exchange rate are caused by economic shocks of various types, and such movements provide valuable information about developments in the Canadian and global economies.

Under the Canadian regime of a *flexible* exchange rate, the value of the exchange rate is determined by market forces. As a result, there is no time-invariant "right" value for the exchange rate—or, more correctly, the current value of the exchange rate is the "right" value in that it is reflecting changes in demand and/or supply conditions in the world's foreign exchange

markets. The exchange rate may rise or fall in the future as events change, both in Canada and abroad. But when the exchange rate is determined in free markets by the actions of millions of participants in hundreds of countries, it makes little sense to think of today's rate as being either "too low" or "too high."[7]

Canadians should not necessarily be indifferent about changes in the exchange rate, however. Such changes are themselves often the reflection of changes in demand for Canadian goods, services, or assets, and these underlying changes will generally have implications for the well-being of many Canadians. Moreover, movements in the exchange rate will change the relative prices of domestic and foreign products and thus will alter the patterns of goods consumed by Canadian households and produced by Canadian firms. These adjustments will also have an impact on the well-being of Canadians. Since the exchange rate is a price determined in markets with both buyers and sellers, however, its changes will affect different Canadians in different ways. I will return to this point when I discuss the economic dislocations that often accompany exchange rate movements.

The Bank views any exchange rate movement as symptomatic of some underlying change in world markets, and recognizes that the movement will itself have effects on the Canadian economy. Since the Bank's policy goal is to keep inflation close to its announced target of 2 per cent, the Bank needs to determine the source of any persistent change in the exchange rate so that it understands how the underlying shock will affect the future path of aggregate demand, output, and inflation. Only then can it hope to design a policy that can, if necessary, offset the effects of the shock in an attempt to satisfy its inflation objectives. But the exchange rate is not a policy target for the Bank.

3. Type One Exchange Rate Movements

This section and section 4 provide a simple taxonomy of exchange rate movements. In this section, I focus on movements in the exchange rate that reflect some underlying event that

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[7] The theory of (absolute) purchasing-power parity (PPP) holds that the exchange rate between two countries is at the "right" level when the price of a basket of goods in one country is equated with the price of the same basket of goods in the other country. There is ample evidence that exchange rates deviate from their PPP levels for long enough periods that the value of the theory comes into question. See Sarno and Taylor (2002, 2003) and Lafrance and Schembri (2002) for excellent reviews.

directly changes the demand for Canadian goods and services. In section 4, I focus on exchange rate movements caused by some underlying event *not* directly related to a change in Canadian aggregate demand. These movements are referred to, respectively, as Type One and Type Two exchange rate movements.

It is useful to keep in mind that, since exchange rates are relative prices of national currencies, they change when shocks have *differential* effects on one country than another. For example, when I consider a shock that increases the demand for Canadian goods and services, I really mean a shock that increases the demand for Canadian products *relative* to those from other countries. In addition, since Canadian trade is heavily biased towards the United States, I emphasize the Can$/US$ exchange rate more than other bilateral exchange rates. Although some economic events may lead to an appreciation of the Canadian dollar relative to the U.S. dollar, they may also lead to a depreciation relative to other major currencies.

3.1 Defining type one exchange rate movements

A Type One *appreciation* of the Canadian dollar is caused by an economic shock that involves a direct increase in the demand for Canadian goods and services. Similarly, a Type One *depreciation* is caused by an economic shock that directly reduces the demand for Canadian products.[8] Three examples help to illustrate these definitions. Each example is a setting that leads to an appreciation of the Canadian dollar (the "opposite" shock in each case would cause a Type One depreciation):

(i) an increase in world relative demand for Canadian-produced goods and services;

(ii) an increase in the world prices of raw materials (caused by either growing world demand or reductions in supply by non-Canadian producers), which leads to an increase in income to Canadian commodity exporters;[9]

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[8] In terms of a simple aggregate demand/aggregate supply diagram (with the domestic price level on the vertical axis and real GDP on the horizontal axis), the underlying shock leads to a shift in the aggregate demand curve, holding the nominal exchange rate and foreign price level constant.

[9] Increases in the world price of raw materials will also affect aggregate supply because Canadian firms use these products as productive inputs. Since Canada is a *net exporter* of raw materials, however, the effect on aggregate demand will dominate the effect on aggregate supply. I focus only on the effect on aggregate demand.

(iii) a flow of foreign financial capital into Canada to finance *new* investment in Canadian physical capital ("greenfield" investment).

The first example is the simplest. An increase in world demand for Canadian products (relative to the demand for other countries' products) clearly leads to a direct increase in Canadian aggregate demand. This shock creates an increase in the relative demand for the Canadian dollar, causing it to appreciate against other currencies.

The second example involves an increase in the prices of many of the products exported by Canada; it is an improvement in Canada's terms of trade and a special case of the first example. To the extent that Canada is a price-taker on world markets, it is immaterial whether the world price rises because of growing world demand or because there is a supply disruption in other countries; in both cases, Canada responds by selling more exports at higher world prices. This increase in income to Canada's exporters again represents a direct positive shock to Canadian aggregate demand, and the expected effect will be an appreciation of the Canadian dollar.[10]

The third example illustrates that not all Type One exchange rate movements originate on the current account of the balance of payments. Suppose entrepreneurs rely on foreign financial capital to finance new investment projects in Canada. The new investment is a direct positive shock to Canadian aggregate demand; the inflow of financial capital increases the demand for domestic currency and causes an appreciation of the Canadian dollar.

3.2 Direct effects and relative price effects on aggregate demand

The three examples provided in section 3.1 are based on shocks that directly increase Canadian aggregate demand (relative to aggregate demand in other countries). As stated earlier, a slightly more precise way to describe these shocks is that, for given values of the nominal exchange rate and domestic and foreign price levels, there is an increase in Canadian aggregate demand.

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[10] It is sometimes claimed that, if the exports are priced in U.S. dollars, there is no reason to expect an appreciation of the Canadian dollar. This view fails to consider the fact that even if the exports are priced in U.S. dollars, the income must eventually be converted into Canadian dollars to pay workers, suppliers, and shareholders. Thus there will still be an increase in demand for Canadian dollars on the foreign exchange market.

An appreciation of the Canadian dollar, by changing the relative prices of domestic and foreign products, leads to *substitution* in spending.[11] Both Canadian and foreign consumers substitute away from the relatively more expensive Canadian goods and services, and towards the relatively less expensive foreign products. In other words, by changing international relative prices, the appreciation of the Canadian dollar leads to a decrease in Canadian exports and an increase in Canadian imports.

Thus there are two distinct effects on Canadian aggregate demand with a Type One exchange rate movement. At the initial value of the exchange rate, the shock itself represents a direct change to aggregate demand. We call this the *direct effect* on aggregate demand. But the shock causes a change in the exchange rate which, by changing relative prices, leads to a change in the net export component of aggregate demand. This is the *relative price effect* on aggregate demand. The overall effect on aggregate demand is given by the sum of the direct effect and relative price effect and, as will be shown later, the overall effect is generally not zero.[12]

The following example illustrates the two effects. Suppose an increase in the world prices of raw materials directly increases Canadian aggregate demand and causes the Canadian dollar to appreciate. The appreciation, in turn, leads to a reduction in net exports (especially in those sectors that do *not* produce raw materials), thus dampening the initial positive effect on aggregate demand. So the direct effect on aggregate demand is positive, whereas the relative price effect on aggregate demand is negative. (The opposite would be true for a Type One depreciation.)

A defining characteristic of Type One exchange rate movements, therefore, is that the direct effect and the relative price effect push aggregate demand in opposite directions. In other

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[11] The increase in Canadian national income tends to increase Canadian demand for both domestic and imported goods—the *income effect* of the shock. If the underlying shock is temporary, however, the income effect will be modest. This paper focuses on the more realistic case of temporary shocks and thus ignores such income effects.

[12] In terms of the simple aggregate demand/aggregate supply diagram, the direct effect is a shift of the aggregate demand curve holding the exchange rate and foreign price level constant; the relative price effect is a shift (in the opposite direction) of the aggregate demand curve brought about by the change in the exchange rate.

words, the movements in the exchange rate help to dampen or absorb the effects of the initial shock to aggregate demand.[13]

3.3 Shocks and resource flows

One important characteristic of an economy subject to Type One exchange rate movements is that the changes in the exchange rate are associated with significant economic disruptions, as reflected by the flow of resources between various sectors of the economy. Consider the economic disruptions created in each of the three examples provided in section 3.1.

In the first example, the shock is an increase in world demand for a wide range of Canadian products. The resulting appreciation of the Canadian dollar will have its usual effect on international relative prices, causing a reduction in net exports, which will also apply to a wide range of products. Note, however, that the direct effect on aggregate demand, coming as it does from world demand, cannot apply to Canadian *non-traded* products, such as restaurant meals, entertainment, or real estate services. Moreover, part of the substitution in demand caused by the currency appreciation will be towards traded (imported) goods, since they will be relatively cheaper in Canadian-dollar terms, and away from relatively more expensive non-traded goods. In summary, there will be a flow of resources within the Canadian economy away from the non-traded-goods sector and towards the traded-goods sector.

In the second example, the shock is an increase in the world prices of a relatively narrow range of products: raw materials. This increase in relative prices generates a flow of economic resources towards the commodity-producing sector; the resources must be drawn away from all sectors that do not produce raw materials, especially manufacturing and some service sectors. Firms that produce and export raw materials suffer from the appreciation but benefit from the initial positive effect on demand; manufacturing firms that produce for the export market suffer from the appreciation but experience no relief from any direct demand effect. This example illustrates what economists call the "Dutch disease"—the crowding out of manufactured and agricultural exports in The Netherlands that followed the significant appreciation of the guilder,

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[13] This "shock absorber" property of the exchange rate is an important part of the case for a flexible (as opposed to fixed) exchange rate. See Murray (2000) for a complete statement of the case.

caused, in turn, by the considerable net exports of natural gas beginning in the 1960s (Buiter and Purvis 1983).

In the third example, the shock is an increase in domestic investment financed by an inflow of foreign financial capital. The direct effect applies specifically to investment goods, and thus there will be a resource flow towards the sectors that produce those products: non-residential construction, machinery, materials, and fabricated metals. The subsequent appreciation of the Canadian dollar will hurt all sectors that produce for export but are unaffected by the initial direct increase in demand.

As an open economy actively engaged in international trade, Canada often experiences such economic disruptions. A recent example followed the Asian crisis in 1997–98, when the sharp decline in income in several Asian economies contributed to a significant decline in their demand for raw materials. The prices of raw materials fell sharply and the currencies of major commodity exporters—including Canada, Australia, and New Zealand—depreciated significantly against the U.S. dollar. Canadian producers of raw materials experienced a sharp reduction in the demand for their products, and therefore a decline in activity, which was only partially offset by the depreciation of the Canadian dollar. But the currency depreciation also led to an increase in demand for the products of exportable manufactured products. As a result, the Canadian economy experienced pressures for a reallocation of resources away from the commodity-producing sectors and towards the manufacturing sectors.

Only a few years later, similar forces were operating in the opposite direction. With the substantial increase in commodity prices in 2003 and 2004, partly driven by the fast-growing world economy, the Canadian dollar appreciated significantly. Canadian producers of raw materials were the beneficiaries of the higher commodity prices, even though their good fortunes were offset somewhat by the stronger domestic currency. Canadian exporters of manufactured goods, in contrast, experienced a decline in foreign demand for their products associated with the appreciation of the Canadian dollar. During this period, the flow of resources was away from the manufacturing sector and towards the commodity-producing sector.

Such economic adjustments and resource flows, as protracted and painful as they may be for the individual workers or firms involved, cannot be the central focus for monetary policy.

The Bank's primary objective is to keep inflation low and stable, and keeping aggregate demand roughly in balance with aggregate supply is essential to this goal. The focus for monetary policy is thus on the behaviour of the *aggregate* economy, rather than on the behaviour of any specific sector. Individual sectors may be expanding while others are contracting—some amount of this kind of intersectoral adjustment will usually occur in a dynamic market economy—but it is the *aggregate* across all of the economy's sectors that is relevant for gauging inflationary pressures. This calls for a more detailed description of the implications of Type One exchange rate movements for monetary policy.

3.4 Implications for monetary policy

Faced with a Type One appreciation of the Canadian dollar, what is the appropriate policy response by the Bank?

Because of the time lags involved in the transmission mechanism, it is undesirable for the Bank to respond to movements in the exchange rate that are expected to be short lived. With such temporary changes in the exchange rate, the effects on the economy are likely to be small, and any effects from a monetary policy response would probably take effect only after the effects of the shock had disappeared. In these situations, an overly reactive monetary policy could contribute to the instability of the economy. For this reason, the Bank attempts, difficult though it is to do, to "see through" short-lived exchange rate movements and focus instead on only persistent exchange rate movements. Understanding the reasons for the movement is central to this task.

The appropriate policy response to an exchange rate movement—even if it is determined to persist and be of a Type One variety—depends importantly on the overall effect on aggregate demand. Consider the case of an increase in world commodity prices that increases income for Canadian exporters and causes an appreciation of the Canadian dollar. The direct effect is a positive shock to aggregate demand; the relative price effect crowds out net exports and thus dampens the direct effect. In the usual case, there will still be a positive net effect on aggregate demand in Canada, and thus a need for monetary tightening by the Bank.

Figure 2 shows the results of simulating the effects of a temporary 10 per cent increase in real commodity prices in the Bank's new projection model, TOTEM (for Terms Of Trade Economic Model). The Bank uses TOTEM to predict the effects of shocks on the Canadian economy and to analyze the effects of monetary policy actions. TOTEM can be used to examine the aggregate demand consequences of external shocks to the demand for goods and services or shocks to the risk premium on Canadian assets; that is, it can be used to explore the differential effects of Type One and Type Two forces. TOTEM is particularly useful for this exercise because it is a multiple-sector model and can therefore highlight the different sectoral effects from such shocks.

Panel A of Figure 2 shows the time path of the underlying shock to commodity prices; a sharp 10 per cent increase that dissipates fully over four years. Panel B shows the resulting appreciation of the Canadian dollar. (The nominal exchange rate is measured as the Canadian-dollar price of one unit of foreign currency, so a reduction in the exchange rate is an appreciation of the Canadian dollar.) Panels C and D show precisely the "Dutch disease" pattern of exports described in section 3.3: commodity exports rise significantly, whereas manufactured exports, facing the headwinds of the stronger currency, are adversely affected.

Total exports nonetheless increase markedly in Panel E, and this increase contributes to the clear boost in aggregate demand (imports, not shown, rise in response to the appreciation, but net exports increase). Since output is determined by demand in the short run, and the path of potential output is unaffected by the shock (not shown), the rise in GDP implies the opening of a positive output gap, and the creation of excess demand in the Canadian economy, as Panel F shows. Monetary policy responds to this shock by raising the target for the overnight rate (Panel G). Despite the policy action, the excess demand results in an increase in the rate of core CPI inflation (Panel H), but the effect is reversed relatively quickly as inflation returns to its initial level within three years.

The simulations shown in Figure 2 begin from a situation in which Canadian GDP is equal to potential output, but this starting point is not central to the result that the appropriate response to the Type One appreciation is a tightening of policy. Whatever the economy's situation when the shock occurs, the Bank will have a desired path for the target for the overnight

rate based on its inflation objectives. The shock and associated Type One appreciation of the Canadian dollar then generate a net positive shock to aggregate demand. To the extent that the shock is believed to be short lived, it will likely be ignored by the Bank. If it is viewed as being relatively long lasting, as in Figure 2, it will lead monetary policy to become tighter (or less accommodative) than it would have been in the absence of the shock.[14]

The likely response of the exchange rate to such an adjustment in monetary policy also must be considered. When the Type One appreciation takes place, the economic disruptions described above will begin to occur, and many firms and workers in the contracting sectors will begin to feel the crowding-out effect associated with the Dutch disease. Often at this point some commentators urge the Bank to prevent and even reverse the appreciation of the currency by reducing interest rates. As noted earlier, however, the appropriate response for the Bank in this case would be to tighten its monetary policy further to offset the inflationary effects of the positive shock to aggregate demand. This policy tightening would have its desired (negative) effect on aggregate demand by raising domestic interest rates and causing a *further appreciation* of the Canadian dollar (evident in the first few quarters of the simulation in Figure 2).

It may seem odd that, faced with a persistent Type One appreciation of the currency, the appropriate response by the Bank is to adjust its policy in such a way that a further appreciation occurs. But this is only odd if one takes the view that the Bank should be aiming its policy at keeping the exchange rate at some desired level. If one keeps in mind that the objective of monetary policy is to maintain low and stable inflation, and that this involves keeping a rough balance between aggregate demand and aggregate supply, then offsetting a net positive demand shock with tighter policy is entirely appropriate. The exchange rate is not a policy target.

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[14] The same logic works in reverse for a Type One depreciation of the Canadian dollar. The net effect on aggregate demand will typically be negative. If the shock is expected to persist, monetary policy will be adjusted to be more expansionary than it would have been in the absence of the shock.

4. Type Two Exchange Rate Movements

4.1 Defining type two exchange rate movements

A Type Two exchange rate movement is associated with an underlying economic shock that *does not* impinge directly on the Canadian market for goods and services; any effect on Canadian aggregate demand or supply works only through the exchange rate movement itself.[15] Three examples are used to illustrate such movements, in each case considering an appreciation of the Canadian dollar (the opposite shock would cause a Type Two depreciation in each case):

(i) an adjustment in financial portfolios towards Canadian assets;

(ii) a flow of financial capital into Canada to finance the purchase of *existing* physical capital ("brownfield" investment);

(iii) a multilateral depreciation of the currency of a major trading partner to resolve its existing current account deficit.

In the first two examples, the increase in demand for Canadian assets—either financial assets or existing physical assets—leads to an increase in demand for Canadian dollars in foreign exchange markets, and this tends to appreciate the Canadian dollar. Both examples involve flows of financial capital and thus transactions in the capital account of Canada's balance of payments.

In the third example, an appreciation of the Canadian dollar may be driven by the expectations of financial market participants who see an appreciation as a part of a global re-alignment of currencies required to resolve existing current account imbalances. Note that such adjustments may reflect less about the sustainability of Canada's international position than about the multilateral currency adjustments required to resolve imbalances among other countries.[16] Note also that such expectations-driven currency adjustments need not involve actual financial flows between countries.

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[15] In the simple aggregate demand/aggregate supply model of the economy, for given values of the nominal exchange rate and foreign price level, the underlying shock does not directly shift the aggregate demand or aggregate supply curves.

[16] Such realignments might involve an appreciation of the Canadian dollar against some currencies but a depreciation against others. What is relevant for Canadian aggregate demand is the value of the Canadian dollar

4.2 Only relative price effects on aggregate demand

None of these three examples shows a direct impact on the demand for Canadian goods and services, and thus on Canadian aggregate demand. Indeed, this absence of any direct effect is the defining feature of Type Two movements in the exchange rate. But, as with Type One movements, the appreciation of the Canadian dollar in each case leads to a change in international relative prices, increasing the relative price of Canadian products while decreasing the relative price of foreign products. Thus, consumers in Canada and the rest of the world are led to substitute away from relatively more expensive Canadian goods and towards relatively less expensive foreign goods. This relative price effect leads to a fall in Canadian net exports and thus to a reduction in Canadian aggregate demand.

For Type One exchange rate movements there are two distinct effects: the direct effect on aggregate demand is partially offset by the relative price effect. In contrast, Type Two movements have only one effect; there is no direct effect, but the relative price effect works just as it does for Type One movements. A simple rule for Type Two exchange rate movements is therefore as follows: with no direct effect on aggregate demand, the overall net effect on aggregate demand must be determined solely by the relative price effect. A Type Two appreciation of the Canadian dollar leads to a reduction in net exports and thus to a decrease in aggregate demand. Conversely, a Type Two depreciation of the Canadian dollar leads to an expansion in net exports and thus to an increase in aggregate demand.

As an example of a Type Two *depreciation* of the Canadian dollar, consider a situation in which global investors decide that Canadian financial assets (bonds and equities) have become more risky than available alternatives in other countries.[17] The reduction in demand for Canadian financial assets has no direct effect on the demand for Canadian goods and services, but it does lead to a depreciation of the Canadian dollar. If this depreciation persists, the relative price effect will eventually increase Canadian net exports and thus increase aggregate demand in Canada. If the example had instead involved an *increase* in demand for Canadian financial assets, because

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relative to an appropriately weighted basket of currencies, in which each weight reflects the share of Canada's trade with that country.

[17] A specific example occurred during the Mexican peso crisis of 1994–95, when financial capital flowed towards the perceived "safe haven" of the United States and away from many countries, including Canada.

of a perception that Canadian assets had become lower-risk investments, the effect would be an appreciation of the Canadian dollar and a consequent reduction in Canadian net exports and aggregate demand.[18]

4.3 Implications for monetary policy

Faced with a Type Two appreciation of the Canadian dollar, which reduces aggregate demand through the relative price effect, what is the appropriate response for monetary policy?

As stated in section 3.4, the time lags involved in the monetary transmission mechanism imply that it is undesirable for the Bank to respond to any movements in the exchange rate that are expected to be short lived. And given the nature of Type Two movements, resulting as they often do from changes in investors' perceptions about relative asset qualities, these movements usually last for only a few weeks before being reversed. Thus, faced with a movement in the exchange rate that appears to be of a Type Two variety, it is especially important for the Bank to assess the likely persistence of the shock.

Figure 3 shows a simulation from TOTEM in which the underlying economic shock is a *decrease* in the perceived risk premium on Canadian financial assets (it also shows the Type One shock from Figure 2, for comparison). Figure 3 therefore shows a special Type Two appreciation of the Canadian dollar—one constructed to give the same initial exchange rate path as for the Type One appreciation shown in Figure 2. This permits a comparison of the effects of equal-size currency appreciations that differ only with respect to their underlying causes. The solid lines show the effects of the commodity-price increase; the dashed lines show the effects of the decline in the risk premium on Canadian assets.

Panel A of Figure 3 shows the time path of the underlying shock to the risk premium, a significant decrease that persists for two years; Panel B shows the effect on the nominal exchange rate, an initial path identical to that for the Type One appreciation. Panels C and D show the path of exports; while commodity exports are only slightly affected, the appreciation of

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[18] Over a longer time span, the change in the risk premium on Canadian assets would likely change interest rates and generate an adjustment in physical investment that works to offset the change in net exports. The net effect on aggregate demand would be the relevant consideration.

the Canadian dollar clearly hampers economic prospects for exporters of manufactured products. Total exports fall in Panel E, and this reduction contributes to a slump in GDP. For a given path of potential output, the slump in GDP implies the opening of a negative output gap and the creation of excess supply, as Panel F shows. Monetary policy responds to this shock by lowering the target for the overnight rate (Panel G), but a reduction in core CPI inflation still occurs (Panel H) for a little over two years.

As in Figure 2, the simulations in Figure 3 begin with a zero output gap, but this starting point is not central to the main policy implication. Whatever the economy's initial situation, the Bank will have a desired path for the policy interest rate. The shock and associated Type Two appreciation of the Canadian dollar then generate a net negative shock to aggregate demand. If the shock is viewed as being relatively long lasting, as in Figure 3, monetary policy will respond by being more expansionary than it would have been in the absence of the shock.[19]

Consider the response of the exchange rate to such an adjustment in monetary policy. When the Type Two appreciation occurs, some commentators will urge the Bank to prevent and even reverse the appreciation of the currency by reducing interest rates. And, indeed, the appropriate policy action in this case is to reduce interest rates (relative to what would otherwise have taken place). When the Bank takes this action, it will appear to some that the Bank has responded to the expressed concerns, and this will reinforce the belief that the Bank has some particular "target" for the exchange rate. But this interpretation would be mistaken. Since the objective of monetary policy is to maintain low and stable inflation, and this involves keeping a rough balance between aggregate demand and aggregate supply, offsetting a persistent and negative demand shock with more accommodative policy is entirely appropriate. Although this policy action offsets the currency appreciation, this is not the guiding objective of the policy. The exchange rate is not the target for monetary policy.

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[19] The same logic works in reverse for a Type Two depreciation of the Canadian dollar. The net effect on aggregate demand will be positive, and if expected to persist, monetary policy will be adjusted to be tighter (or less expansionary) than it would have been in the absence of the shock.

5. Putting It All Together

I have analyzed two types of exchange rate movements; Figure 4 summarizes their key differences in terms of their component parts and overall effects on aggregate demand. The left-hand panel shows a Type One appreciation of the Canadian dollar, caused, for example, by an increase in the world price of raw materials. The red bar shows that the direct effect of the increase in prices for raw materials leads to an increase in aggregate demand; the green bar shows that the subsequent appreciation of the dollar reduces net exports and aggregate demand. The blue bar indicates that the overall effect on Canadian aggregate demand is positive, as illustrated by the TOTEM simulations.

The right-hand panel of Figure 4 shows a Type Two appreciation of the Canadian dollar, perhaps caused by a portfolio rebalancing towards Canadian assets. Note that the size of the currency appreciation is the same in both panels, as reflected by the same size of the relative price effect (the green bar). For a Type Two appreciation, however, there is no direct effect, and so the overall effect on aggregate demand is clearly negative.

5.1 An ongoing challenge for monetary policy

A practical problem for monetary policy is that, while movements in the exchange rate become apparent almost instantly, it is not easy to determine what events are causing the exchange rate to move. Here lies a central policy challenge, for without determining the cause of the movement in the exchange rate it is not possible to determine the net effect on aggregate demand and thus the appropriate response for monetary policy. This task is far from simple: it requires that the Bank examine an entire range of economic variables from many different data sources, and closely monitor developments in Canada as well as in its major trading partners.

The challenge of accurately identifying the cause of even a large and persistent movement in the exchange rate is made more difficult by the fact that very often several causes may exist at the same time. In particular, the various economic shocks occurring in either the Canadian or world economies may give rise to a *combination* of Type One and Type Two movements. In such a situation, opposing forces would likely be acting on Canadian aggregate demand, and the Bank would have to determine the relative importance of each force.

Consider a hypothetical but realistic example. Suppose the economic environment in Canada—including taxation, regulation, productivity growth, and inflation—improves in such a way that the country is viewed as being a more favourable location in which firms can invest and operate.[20] This improvement could lead to two different shocks for the Canadian economy. First, foreign or multinational firms may choose to locate more of their productive facilities or head offices in Canada, and they may bring the financial capital necessary to finance the construction of such facilities. In this case, the inflow of financial capital will cause an appreciation of the Canadian dollar, and the new construction will represent new investment in physical capital. This is a Type One appreciation of the Canadian dollar, because there is a direct positive effect on aggregate demand. The second force that would likely stem from an overall improvement in the Canadian economic environment is that global investors would choose to rebalance their portfolios towards Canadian financial assets. The inflow of financial capital used to make such purchases would lead to an appreciation of the Canadian dollar, but there would be no direct effect on Canadian aggregate demand; this is a Type Two appreciation.

In this example, the Canadian dollar would likely appreciate as a result of *both* Type One and Type Two forces. If so, the task for monetary policy would be complicated by the need to determine the *relative* contribution of Type One and Type Two exchange rate movements to the overall appreciation. The Type One movements are working to increase aggregate demand, whereas the Type Two movements are providing an offset, reducing aggregate demand. In a very special circumstance, the two movements may exactly offset each other, so that there would be no net effect on aggregate demand; in this case, the Bank could leave its monetary policy unchanged. But a more likely situation would have the two sets of forces not exactly offsetting each other, and the Bank needing to make its best assessment of the overall net effect on aggregate demand. Its policy decision would be based on this assessment.

5.2 Policy-making is not formulaic

The preceding paragraph may lead some to conclude that the design and conduct of monetary policy may be amenable to the use of simple or mechanical rules, but the truth is the opposite.

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[20] I have intentionally chosen an "event" that is probably long lasting, thus making the exchange rate movement likely to be persistent. This allows me to focus on the still-complicated task of determining the relative

This paper's main point is that different causes of exchange rate movements imply different net effects for Canadian aggregate demand. This fact, given the Bank's objective of stabilizing inflation by keeping a rough balance between aggregate demand and potential output, means that there can be no simple monetary policy rule that "an X per cent depreciation (or appreciation) of the currency should lead the Bank to raise (or lower) its policy rate by Y basis points." The *cause* of the exchange rate movement is as important as the movement itself.[21]

The absence of mechanical policy rules underlines the fact that the persistence of any given economic shock is never known with precision. Thus, decisions regarding monetary policy can be described as decision making under uncertainty. The policy decisions are based on the Bank's assessment of the probable source and likely persistence of the shocks, the current state of the Canadian and world economies, and the shocks that are expected to occur in the near future. This overall assessment is based on the Bank's knowledge of historical patterns, insights from ongoing research, and a considerable amount of judgment.

5.3 An example from recent history

The distinction between Type One and Type Two exchange rate movements can be used to interpret economic developments and the Bank's policy actions during 2003 and 2004, a time when the Canadian dollar appreciated sharply against the U.S. dollar. Both types of exchange rate movements appear to have been operating during this period, although their relative importance shifted over time, as Figure 5 shows.

In 2003, the Canadian dollar appreciated against the U.S. dollar by just under 20 per cent, from below 65 cents (US) in January to over 75 cents (US) in December. What was the cause of this appreciation? Real non-energy commodity prices increased by about 12 per cent, a clear Type One force. At the same time, the U.S. dollar weakened against the currencies of all major countries (including other large commodity importers) by roughly 15 per cent, suggesting the presence of powerful Type Two forces. Net exports made a significant negative contribution to

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importance of Type One and Type Two forces. Reality would no doubt present policy-makers with an even more complicated task, because the persistence of the exchange rate movement would be less clear.

[21] The fact that the appropriate policy response to an exchange rate movement depends on the cause of the movement is emphasized by Freedman (1995), who discusses how the Bank used the monetary conditions index (MCI) in the mid-1990s.

Canada's economic growth in 2003, and this slowdown is consistent with the possibility that Type Two forces were dominant at that time. The Bank's decision to reduce its target for the overnight rate in early 2004 might be explained by the perception that this slowdown in net exports was expected to continue.

By the late summer of 2004, however, rising world commodity prices and fast-growing world demand had been a key feature of the economic environment for several months. Though the U.S. dollar continued to weaken during this period, net exports made a substantial positive contribution to Canadian GDP growth in the first half of 2004. These developments are consistent with Type One forces playing the dominant role. With the Canadian economy fast approaching its capacity limits, the Bank raised its policy interest rate in September.

By very late in 2004, however, the balance of economic forces shifted again, with an increase in the relative importance of Type Two factors. The U.S. dollar weakened sharply against all the major floating currencies, and the Canadian dollar appreciated to a 13-year high of over 85 cents (US), despite a decline in commodity prices and a weakening outlook for global economic growth. Thus, Type Two forces were likely driving the strength in the Canadian dollar, offsetting the neutral or even negative Type One forces. The Bank's target for the overnight rate was left unchanged at its December 2004 fixed announcement date. (By July 2005, the Bank's target for the overnight rate was still at the level of October 2004; it had remained unchanged for nine months.)

6. Conclusions

This paper has provided a non-technical explanation of how the exchange rate fits into the Bank of Canada's framework for monetary policy. Four key points have been made. First, the Bank seeks to make the best possible contribution to the well-being of Canadians and, towards this end, its objective is to maintain a low and relatively stable rate of inflation. An essential part of the Bank's inflation-targeting approach is a flexible exchange rate that is free to adjust in response to various developments in the Canadian and world economies. The Bank does not have a target for the exchange rate.

Second, monetary policy works partly through its influence on the exchange rate. Movements in the exchange rate are both an effect and a cause. A change in the policy interest rate will generally lead to a movement in the exchange rate which, in turn, will alter international relative prices and lead to a change in net exports and thus aggregate demand. The exchange rate is therefore an integral part of the monetary transmission mechanism.

Third, when there is a movement in the exchange rate for reasons unrelated to a change in domestic monetary policy, a central challenge for the Bank is to determine the persistence of the movement and the likely net effect on aggregate demand. Only then can the Bank design the appropriate policy action consistent with its objective of keeping inflation low and relatively stable. Type One exchange rate movements are caused by events that directly affect Canadian aggregate demand; with these movements, the direct effect and the relative price effect push aggregate demand in opposite directions. For Type Two exchange rate movements, caused by events that have no direct effect on Canadian aggregate demand, only the relative price effect plays a role.

Finally, monetary policy is complicated by the fact that observed movements in the exchange rate are often the result of multiple changes in the Canadian or world economies. In these situations, the Bank must determine the relative importance of Type One and Type Two forces. This is especially important because in many situations the two types of forces will be producing opposite pressures on aggregate demand. Sometimes they will offset each other to the extent that no monetary policy action is required. At other times, there will be a significant net effect on aggregate demand, and the Bank must seek to understand the underlying causes of the exchange rate movement in order to design the appropriate policy action.

References

Bank of Canada. 1996. The Transmission of Monetary Policy in Canada. Ottawa: Bank of Canada.

Blanchard, O.J. 2003. "Comments on 'Inflation Targeting in Transition Economies: Experience and Prospects' (by J. Jonas and F. Mishkin)." NBER Conference on Inflation Targeting, January 2003.

Buiter, W. and D. Purvis. 1983. "Oil, Disinflation, and Export Competitiveness: A Model of the Dutch Disease." In *The International Transmission of Economic Disturbances Under Flexible Exchange Rates*, edited by J. Bhandari and B. Putnam. Cambridge: MIT Press.

Dedola, L. and F. Lippi. 2005. "The Monetary Transmission Mechanism: Evidence from the Industries of Five OECD Countries." *European Economic Review* 49: 1543–69.

Dodge, D. 2005. "Monetary Policy and Exchange Rate Movements." Speech to the Vancouver Board of Trade, Vancouver, British Columbia, 17 February.

Duguay, P. 1994. "Empirical Evidence on the Strength of the Monetary Transmission Mechanism in Canada: An Aggregate Approach." *Journal of Monetary Economics* 33: 39–61. Also in *The Transmission of Monetary Policy in Canada*. Ottawa: Bank of Canada, 1996.

Engert, W. and J. Selody. 1998. "Uncertainty and Multiple Paradigms of the Transmission Mechanism." Bank of Canada Working Paper No. 98–7.

Farès, J. and G. Srour. 2001. "The Monetary Transmission Mechanism at the Sectoral Level." Bank of Canada Working Paper No. 2001-27.

Freedman, C. 1995. "The Role of Monetary Conditions and the Monetary Conditions Index in the Conduct of Policy." *Bank of Canada Review* (Autumn): 53–59.

Friedman, M. 1968. "The Role of Monetary Policy." *American Economic Review* 58: 1–17.

———. 1977. "Nobel Lecture: Inflation and Unemployment." *Journal of Political Economy* 85: 451–72.

Lafrance, R. and L. Schembri. 2002. "Purchasing-Power Parity: Definition, Measurement, and Interpretation." *Bank of Canada Review* (Autumn): 27–33.

Laidler, D. and W. Robson. 2004. *Two Percent Target*. Toronto: C.D. Howe Institute.

Longworth, D. 2002. "Inflation and the Macroeconomy: Changes from the 1980s to the 1990s." *Bank of Canada Review* (Spring): 3–18.

Macklem, T. 2001. "A New Measure of Core Inflation." *Bank of Canada Review* (Autumn): 3–12.

Murray, J. 2000. "Why Canada Needs a Flexible Exchange Rate." *North American Journal of Economics and Finance* 11: 41–60.

Ragan, C. 1999. "Explaining A Seeming Inconsistency: The Exchange Rate and the Bank of Canada." *Canadian Business Economics* (December): 34–37.

Sarno, L. and M. Taylor. 2002. "Purchasing Power Parity and the Real Exchange Rate." International Monetary Fund Staff Papers 49: 65–105.

———. 2003. *The Economics of Exchange Rates*. Cambridge: Cambridge University Press. See especially Chapter 3.

Thiessen, G. 1995. "Uncertainty and the Transmission of Monetary Policy in Canada." In *The Transmission of Monetary Policy in Canada*. Ottawa: Bank of Canada.

Figure 1

The Transmission Mechanism of Monetary Policy

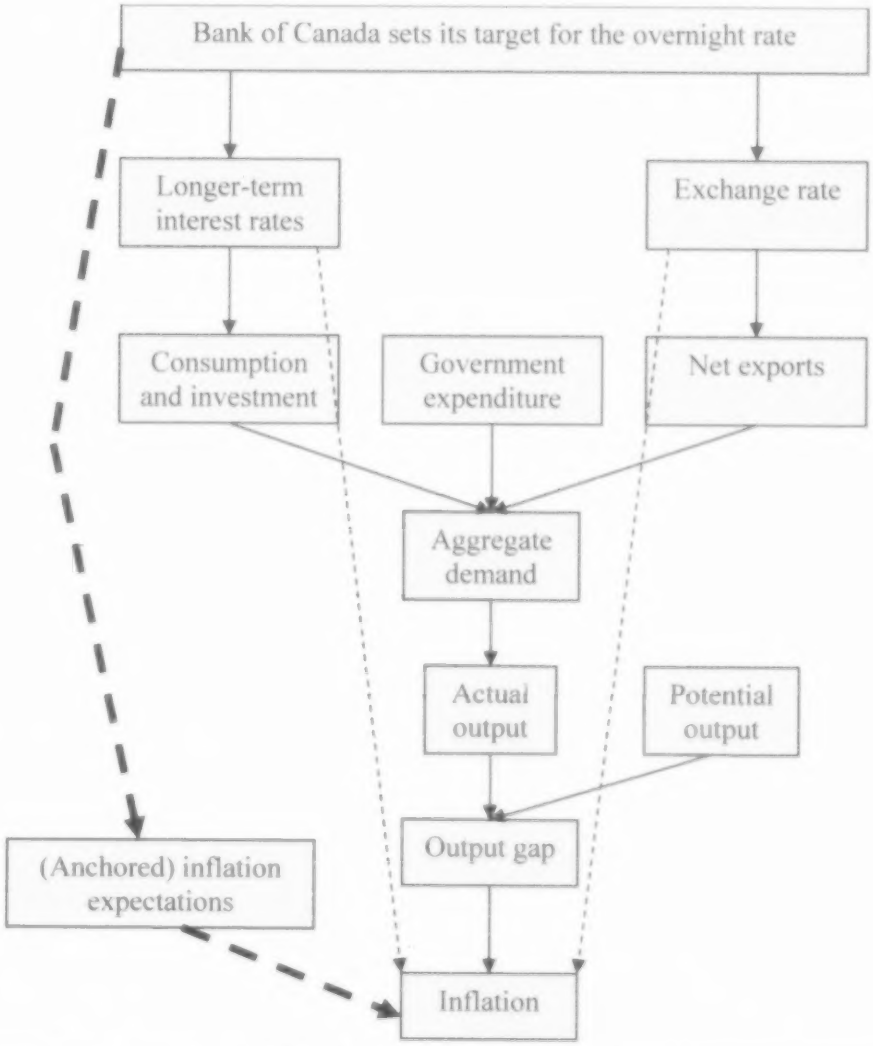


Figure 2

Type One Appreciation Caused by Increase in Commodity Prices

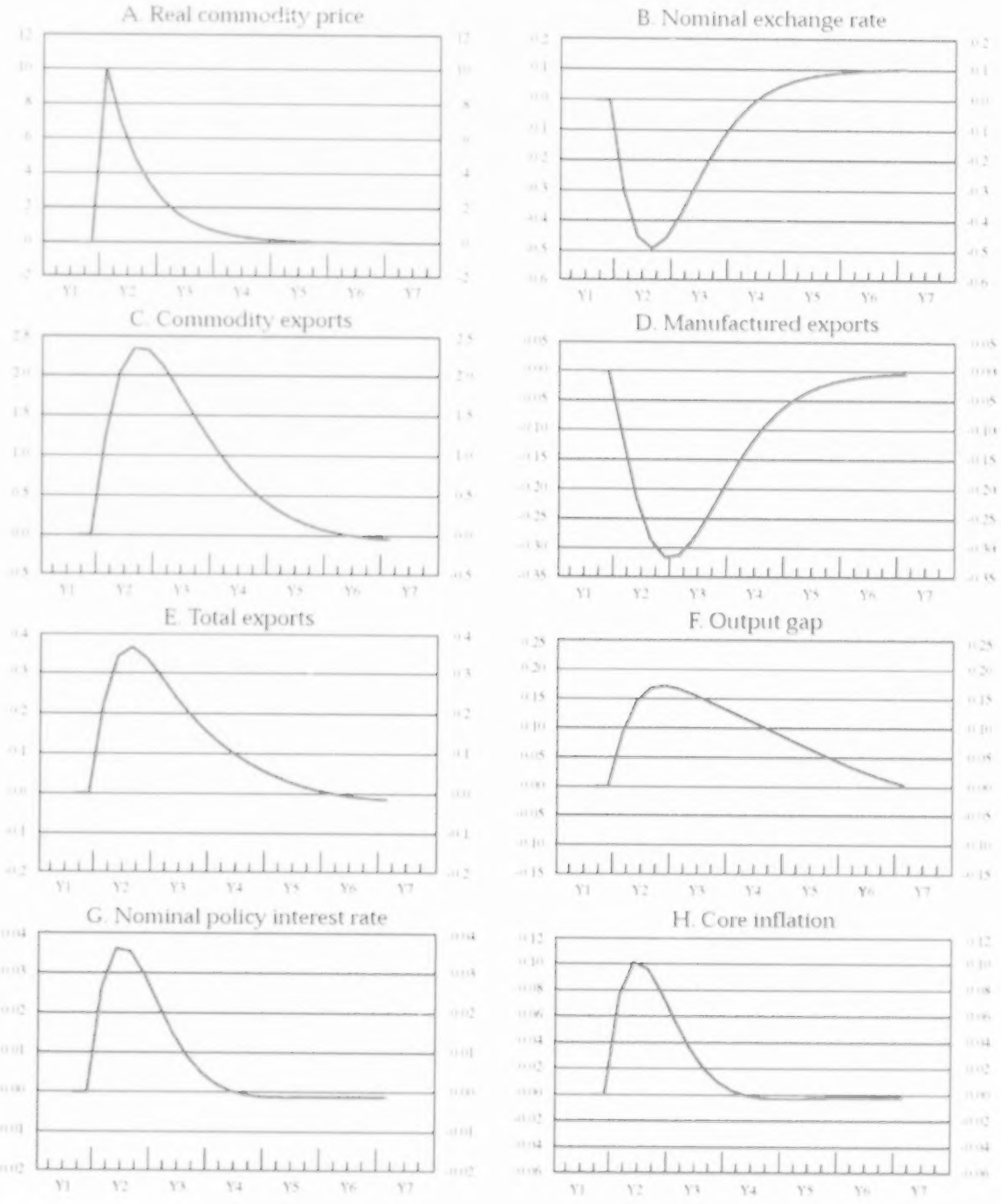


Figure 3

Type One and Type Two Appreciations Compared

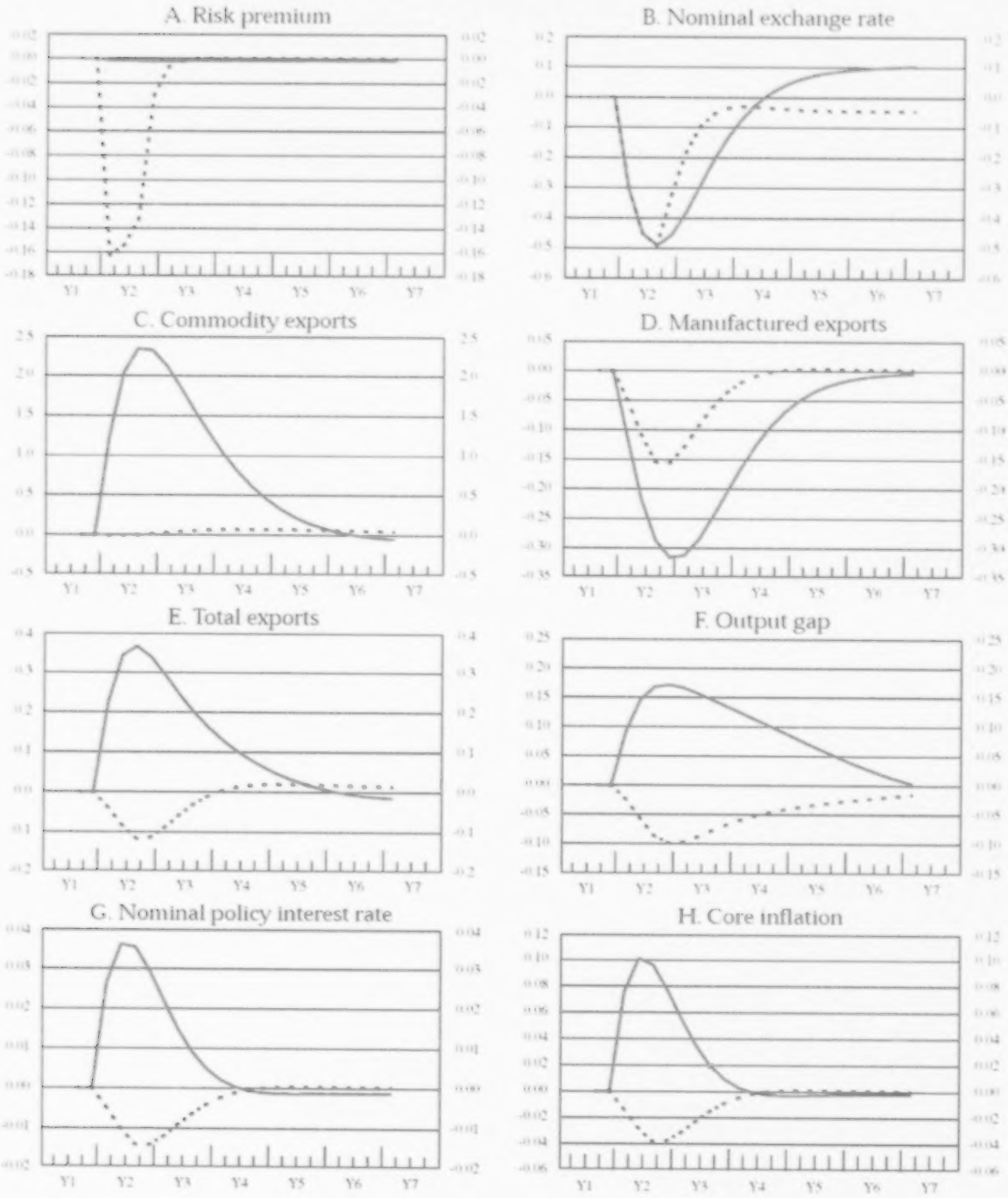


Figure 4

The Effects on Aggregate Demand of Type One and Type Two Appreciations

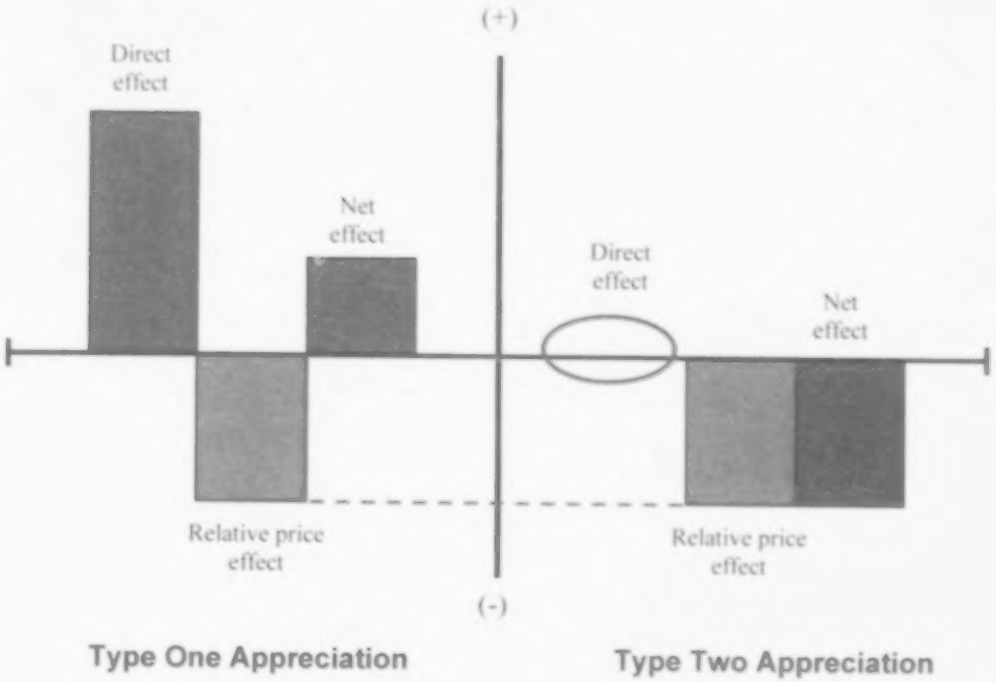
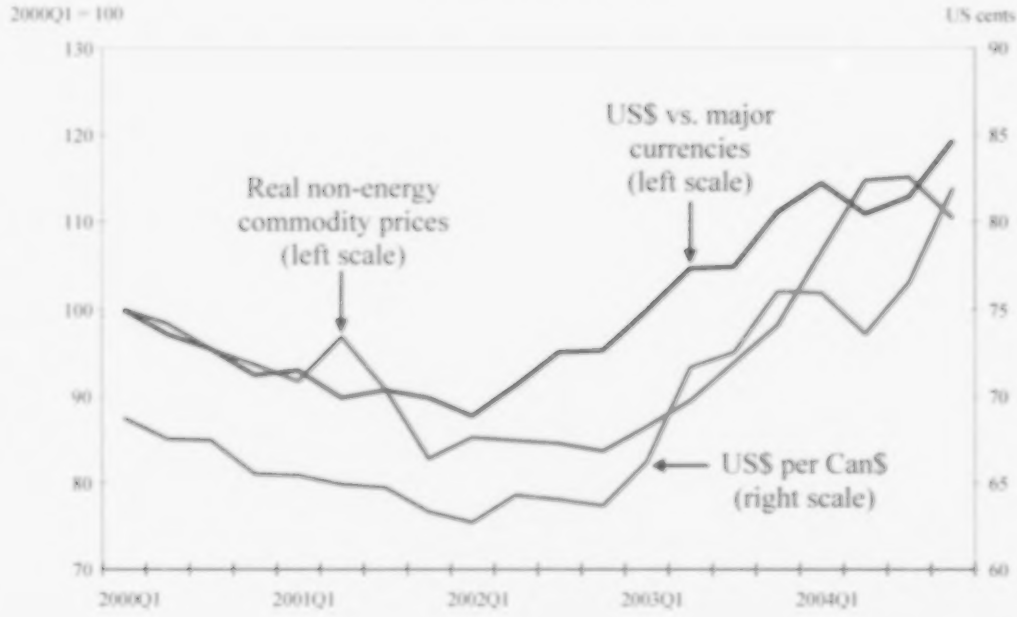


Figure 5

Two Forces Behind Movements in the Canadian Dollar, 2000-2004

Quarterly averages



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